

RECYCLED PET MICROFIBRE FOR INTERNAL COVERINGS FOR THE CAR SECTOR

AUTO LINE

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This EPD is compliant with ISO 14025

ENVIRONMENTAL PRODUCT DECLARATION



1. Company and product description

1.1 THE GROUP

Miko S.r.l. was established in 1997 in Gorizia as a producer of non-woven microfibres for the furniture sector. Miko's core business is the production of **Dinamica® by Miko**, a microfibre partially obtained from recycled polyester, produced using an innovative water-based process without the use of organic solvents. Through the years, Miko has broadened its product range to respond to the demands of other areas of application including the automotive sector. Today, internal car coverings constitute the main sector of use for **Dinamica®**.

In 2015, Miko was acquired by **Sage Automotive Interiors**, one of the world's leading providers of automotive bodycloth with headquarters in South Carolina (U.S.) and in 2018 the Sage Group including Miko was purchased by the Japanese **Asahi Kasei**, the producer of the raw material of **Dinamica®**.

1.2 THE PRODUCTION SITES

Miko's headquarters are in Gorizia, via Ressel 3. The whole process takes place at this exclusive site in Italy: transformation, dyeing and finishing of the raw support supplied by the Japanese partner **Asahi Kasei**, to obtain a product that meets the requirements of customers and the sector. The company is mainly active in the following geographical areas: Europe, North and South America, Asia and Australia.

The production of **Dinamica®** for the automotive sector has been continuously expanding since 2010 and currently accounts for 95% of Miko's production. Following significant revenue increases, the Sage Group and Asahi Kasei have adopted important commercial and production strategies based on new car programs, which will translate into further economic growth starting in 2018.

1.3 ENVIRONMENT AND RESPONSIBILITY

Environment

Over the years, Miko has demonstrated **its constant and active commitment to preventing and minimizing the impacts of its processes and products on the environment**, a commitment to which the adopted Environmental Policy bears witness.

Since its establishment in 1997, Miko applies the principles of the Circular Economy with the main objective of limiting the use of virgin raw materials in favor of **secondary raw materials** (rif. fig. 1.1). In the case of Dinamica® it is possible to speak of real **upcycling** because the waste of polyester becomes a raw material of higher value compared to previous life. Dinamica® is in fact applied to products for the luxury, design and hi-tech segments. **Plastic is too valuable to be disposed as waste:** to ensure circularity throughout the life cycle of the microfibre, Miko is advancing some proposals to **recycle Dinamica® at the end of its life** transforming it into also for the automotive sector, such as panels for thermal and acoustic insulation. These proposals have already been shared with some major European car manufacturers and fit into Miko's future environmental sustainability development programs.

Miko considers **respect for the environment and sustainable development** as strategic factors in the exercise and development of its activities and decisive for consolidating its leadership in the market. For these reasons, the organization has adopted a **Life Cycle Thinking approach and credible communication** of the environmental performance of its products.

With the aim of making systematic the method applied for the **EPD® certification of the Dinamica® Auto line** (EPD No. SP-00351) to all the company's products, Miko laid the foundations of a project completed in 2013 with the certification of the **EPD® Process**.

This certification gives Miko the possibility to internally handle the management of EPD® data involved in the verification procedure by itself and issue new EPDs for registration. This will lead to eco-design: products designed to increase the environmental performances of Dinamica®.

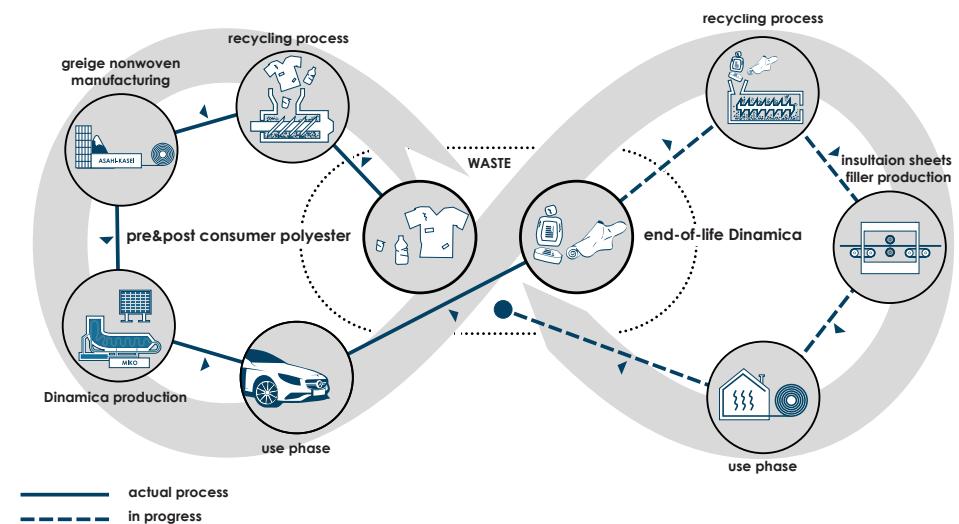


Fig. 1.1 Miko and Circular Economy

In this context, the strategic objectives pursued by Miko are:

- to communicate the environmental data of its products through EPD® certifications;
- to monitor the environmental impacts associated with the life cycle of products through LCA;
- to improve the environmental performance of products through eco-design, in synergy with the objectives of the environmental policy;
- to activate partnerships with its customers and suppliers in order to obtain information about the environmental performance of products during the various stages of the supply chain, and to evaluate opportunities for improvement;
- to provide guidance to stakeholders through specific initiatives, to raise external awareness and communication activities, and to train the employees on the most important environmental issues.

Miko's attention to environmental issues is also confirmed by the certification of its **Environmental Management System** (EMS) in compliance with the standard **ISO 14001**, which systematically monitors the impact of the activities carried out in the various production phases and guarantees the conformity of the organisation to the standard. Miko's production processes are certified to **ISO 9001** and **ISO 16949**, underlining the conformity of its company processes to the most advanced quality assurance system applied in the automotive industry.

Starting from February 2018, Miko has obtained the **IATF 16949:2016** certification which replaces the old ISO / TS 16949 specification.

With the scope to improve its environmental performance, in recent years Miko has developed important projects that have contributed to optimizing production cycles leading to a significant **reduction in energy consumption, water and chemical products** used in the various stages of production. Furthermore, since 2014, Miko has **reduced the consumption of process water** by adopting an internal recirculation system of the part of water used for the washing phase.

In 2017, R&D activities focused on some specific activities applied to internal processes and in particular:

- the optimization of dyeing cycles with a consequent reduction in the consumption of water for the washing of Dinamica® and of chemical products for dyeing
- the use of raw material with 70% and 90% of black fiber in order to reduce the amount of colorants used in dark-based recipes



In addition, Miko covers part of its energy needs through renewable energy from the 1 MW photovoltaic plant located in the roof of the production plant, further evidence of its commitment to the application of the fundamentals of the Circular Economy.

Responsibility

On July 26th 2013, the Board of Directors of Miko S.r.l. formally adopted the **Organization and Management Model** (Modello di Organizzazione e Gestione), pursuant to Legislative Decree no. 231/01 (Liability of legal persons), together with the relevant **Code of Ethics and Conduct** both under review from 2017 in order to adapt to current regulatory changes. This fundamental document is geared to ensure fairness and transparency in the conduct of business and corporate activities, to protect its position and image, as well as the expectations of its stakeholders.

In 2014, Miko obtained the authorization for emissions into the atmosphere, discharge of industrial wastewater and compliance with the forecast of the future acoustic zoning of the industrial zone with a validity of 15 years. During the same year, the organization implemented an accident prevention and protection system -emergency management- technically updating its staff and experimenting with specific risk scenarios.



1.4 THE PRODUCT

Dinamica® by Miko is the made-in-Italy microfibre which is produced in part by using **recycled polyester** (the recycled content varies according to the product line and application) **without the use of organic solvents*** but using a water-based process.

The manufacturing process used by Dinamica® makes it possible to extract fewer virgin raw materials since it uses a part of **recycled fibres of waste products** which would otherwise be sent to landfill sites or incinerated, thereby reducing CO₂ emissions and other environmental impacts associated with these processes.

Under the microscope, Dinamica® is composed of three layers: face, inner scrim and backing.

Submerged in a water solution, the inner scrim attracts small polyester fibres, which are suspended in the liquid, to both surfaces; these are compacted using a water-based needle punching process.

The microfibre is then immersed in a **water polyurethane bath**, which, in contrast to normal production cycles, does not contain the solvents that are harmful to health and the environment. This process compacts the fibres, making them elastic and resistant. During the dyeing and finishing stage, the production cycles are optimised and monitored managing the energy consumption at best and minimising the waste of chemical products and water which is then drained through our purifier and partially re-used.

In 2019, Dinamica® received the "PETA-approved Vegan" certification, attributed by PETA to companies that undertake not to use raw materials of animal origin in the making of their products.

For the automotive sector, Dinamica® is available in the **Auto** version in which 2 of the 3 layers come from recycled polyester. By changing the face layer it is possible to achieve the Silk variant, characterized by a striped effect similar to real silk. To complete the product range for the automotive sector, Dinamica® **Auto Stretch** and Dinamica® **Wide** have also been on the market for some years. Their elastic structures allow to cover curved surfaces through industrial and not necessarily manual productions.

But Miko's research wanted to go further. The company is in fact working on the development of **Dinamica® Auto Pure**, a new product for the car in which even the **inner scrim comes from recycled fibers**. This product has already aroused the interest of some car manufacturers, especially for the electric car segment where there is a continuous search for components and accessories that limit the use of virgin raw materials.

In order to provide cutting-edge products in the field of high quality microfibres, Miko is advancing the idea of gradually replacing the Auto product with Auto Pure in order to guarantee its customers a microfiber with increasingly higher technical and environmental performances.

In terms of technical performance, Dinamica® Auto and Dinamica® Auto Pure have the same nominal values, but the environmental performance results concerning the CO₂ emissions differ greatly, due to the percentage difference in recycled polyester content.

The technical characteristics of Dinamica® Auto, Dinamica® Auto Pure, Dinamica® Auto Stretch and Dinamica® Wide are given at page 8 (tab.1.1).

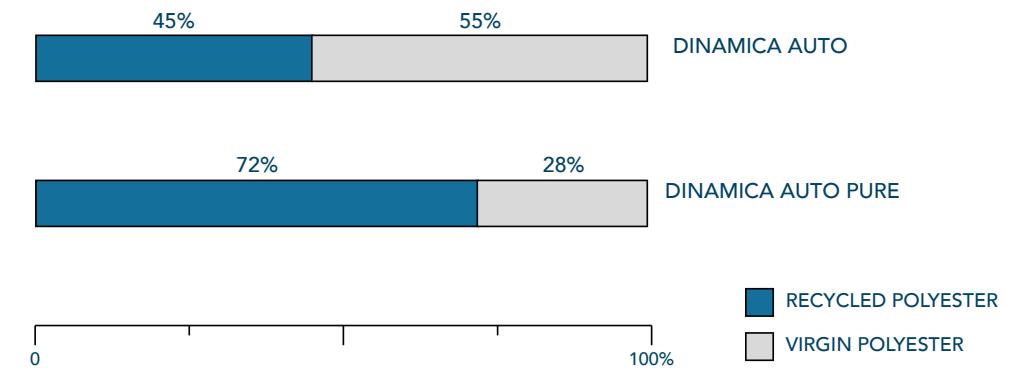


Fig. 1.2 Dinamica® Auto and Auto Pure PET composition

*For example, DMF and trichloroethylene that can be used to manufacture synthetic materials.

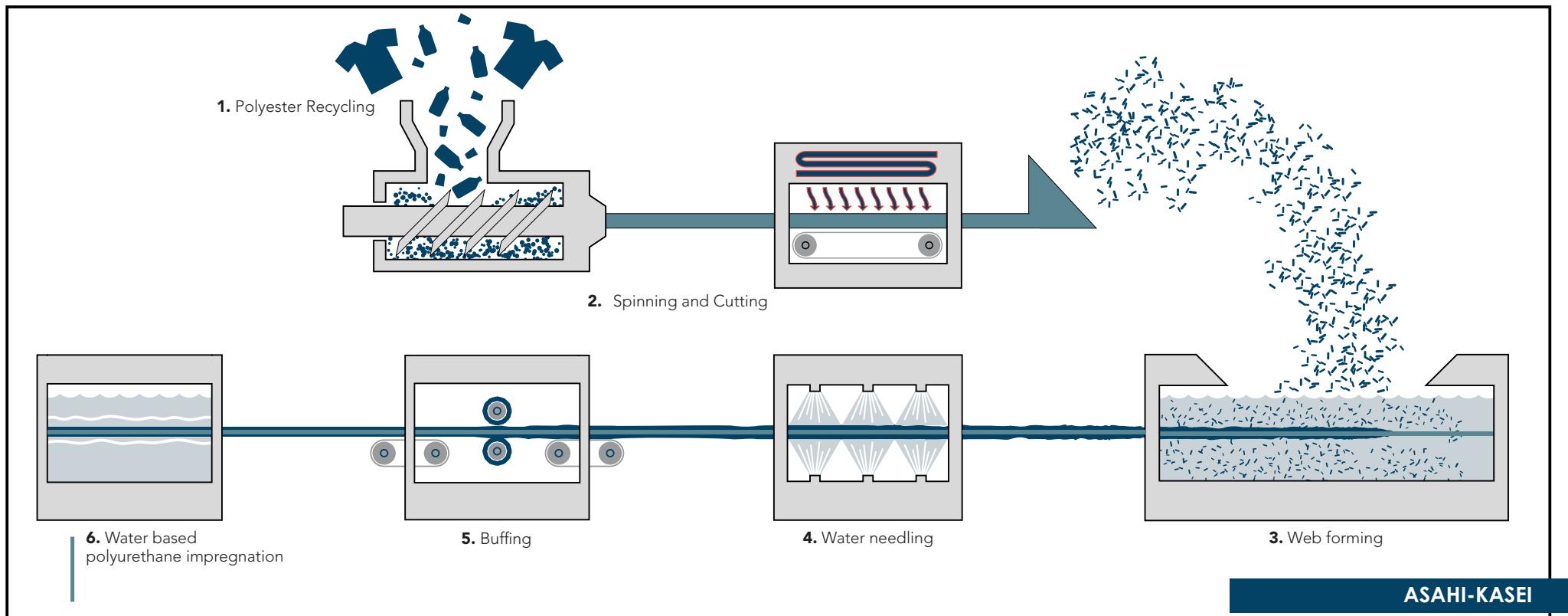


Fig. 1.3 Dinamica® Auto production process from Asahi Kasei to MIKO.



TYPE OF TEST	TEST METHOD	UNIT	DINAMICA® PRODUCT		
			Auto - Auto Pure	Stretch	Wide
Weight	DIN EN ISO 29073/1	g/m ²	300 +/- 30	300 +/- 30	265 +/- 30
Thickness	DIN EN ISO 5084	mm	1,10 +/- 0,10	1,10 +/- 0,10	1,05 +/- 0,12
Usable width	UNI EN 1773	mm	≥ 1400	≥ 1400	≥ 1600
Tensile strength	DIN EN ISO 13934/1	N	≥ 600	≥ 600	L ≥ 500 T ≥ 200
Tensile strength (after 2h in water)	DIN EN ISO 13934/1	N	≥ 600	≥ 600	L ≥ 500 T ≥ 200
Tensile strength (after 3 cycles ISO 105 B06)	DIN EN ISO 13934/1	N	≥ 600	≥ 600	L ≥ 500 T ≥ 200
Breaking elongation at maximum force	DIN EN ISO 13934/1	%	≥ 30	≥ 35	≥ 30
Tear strength	DIN EN ISO 13937/2	N	≥ 15	≥ 15	≥ 15
Abrasion resistance with Martindale	DIN EN ISO 12947	Cycles	50.000	25.000	25.000
Abrasion resistance with Martindale (after 1 cycle ISO 105 B06)	DIN EN ISO 12947	Cycles	50.000	25.000	25.000
Color Fastness to Light (Ci 4000, 3 cycles)	DIN EN ISO 105-B06 (set of conditions n°3)	Grey scale ISO 105-A02	≥ 3/4	≥ 3/4	≥ 3/4
Color fastness to Rubbing	DIN EN ISO 105-X12	Grey scale ISO 105-A03	Dry ≥ 4	Dry ≥ 4	Dry ≥ 4
			Wet >4 Dark Colour ≥ 3/4	Wet >4 Dark Colour ≥ 3/4	Wet >4 Dark Colour ≥ 3/4
Color fastness to perspiration (Alkaline)	DIN EN ISO 105-E04	Grey scale ISO 105-A02/03	Change in color: ≥4/5	Change in color: ≥4/5	Change in color ≥ 4/5
			Stain pes/co: ≥ 4	Stain pes/co: ≥ 4	Stain pes/co ≥ 4
Color fastness to perspiration (Acid)	DIN EN ISO 105-E04	Grey scale ISO 105-A02/03	Change in color: ≥4/5	Change in color: ≥4/5	Change in color ≥ 4/5
			Stain pes/co: ≥ 4	Stain pes/co: ≥ 4	Stain pes/co ≥ 4
Color fastness to Water	DIN EN ISO 05-E01	Grey scale ISO 105-A02/03	Change in color: ≥4/5	Change in color: ≥4/5	Change in color ≥ 4/5
			Stain pes/co: ≥ 4	Stain pes/co: ≥ 4	Stain pes/co ≥ 4
Fogging	DIN 75201 (Method A)	Fogging scale	≥ 70	≥ 70	≥ 70

Tab. 1.1 Technical characteristics of Dinamica® Auto Line

1.5 PRODUCT COMPOSITION

Dinamica® Auto

92% polyester and 8% polyurethane

Analyzing the percentage of polyester, we can make this distinction:

FACE: 100% recycled polyester microfiber 0,15d

INNER SCRIM: 100% polyester 150d

BACKING: 10% recycled polyester microfiber 0,15d and 90% polyester FR 0,50d

Dinamica® Auto Stretch

88% polyester and 12% polyurethane

Analyzing the percentage of polyester, we can make this distinction:

FACE: 100% recycled polyester microfiber 0,15d

INNER SCRIM: 100% **stretchable** polyester 150d

BACKING: 10% recycled polyester microfiber 0,15d and 90% polyester FR 0,50d

Dinamica® Auto Stretch is available in rolls of 1,42m width.

Dinamica® Auto Pure

92% polyester and 8% polyurethane

Analyzing the percentage of polyester, we can make this distinction:

FACE: 100% recycled polyester microfiber 0,15d

INNER SCRIM: 100% **recycled** polyester 150d

BACKING: 10% recycled polyester microfiber 0,15d and 90% polyester FR 0,50d

Dinamica® Wide

88% polyester and 12% polyurethane

Analyzing the percentage of polyester, we can make this distinction:

FACE: 100% recycled polyester microfiber 0,15d

INNER SCRIM: 100% **stretchable** polyester 150d

BACKING: 10% recycled polyester microfiber 0,15d and 90% polyester FR 0,50d

Dinamica® Auto Wide is available in rolls of 1,60 width.

The recycled polyester comes from:



PLASTIC BOTTLES (PET)



UNIFORMS



CLOTHING



POST INDUSTRIAL WASTE

1.6 INFORMATION ON THE PHASES OF USE AND END-OF-LIFE MANAGEMENT

Dinamica® Auto and Auto Pure are microfibre used to cover seats, backrests, headrests, dashboards, rear parcel shelves, door panels and armrests. Dinamica® Stretch and Wide are suitable to cover headliners, pillars, sun visors and door panels.

At the end of its life cycle, Dinamica® is disposed of **in compliance with the directives concerning vehicles** in the various countries of use and disposal. Miko is starting partnerships with some European car manufacturers interested in **monitoring the life cycle of Dinamica® from cradle to grave**.

This study will allow us to understand the concrete impact of Dinamica® on the environment but will also offer food for thought on the end-of-life management of non-woven fabrics. Some initial tests have shown that Dinamica® can be recycled and fully transformed into semi-finished products such as thermal and sound insulation panels.



2. Evaluation of environmental performance

The environmental performance of Dinamica® has been assessed using the **LCA (Life Cycle Assessment)** analysis method, starting from the extraction of the raw materials up to the completion of the finished product.

The study was carried out in conformity with the **ISO 14040 standards**, following the **Product Category Rules (PCR)**, approved by the technical committee of the International EPD System: PCR 2011:06 NONWOVENS FOR CLOTHING, PROTECTIVE CLOTHING AND UPHOLSTERY.

The Upstream Processes include:

- extraction and processing of the raw materials;
- production of inputs for the production of the raw non-woven fabric;
- production of chemicals for dyeing, finishing and water treatment;
- production of packaging for the non-woven fabric and the finished product;
- transport of waste for the production of recycled PET.

2.1 DECLARED UNIT

The declared unit is represented by 1 m² of Dinamica® non-woven fabric with a weight of:

- 330 g/m² for Dinamica® Auto, Auto Pure and Auto Stretch
- 295 g/m² for Dinamica® Wide

2.2 SYSTEM BOUNDARIES

The system boundaries, presented in Figure 2.1, include the **Upstream Processes and the Core Processes** of the non-woven Dinamica® fabric. The definition of the system boundaries complies with the rules laid down in the referenced PCR document.

The Core Processes include:

- production of raw non-woven fabric;
- dyeing and finishing;
- treatment of process waters;
- transport of inputs for the production of raw non-woven fabric;
- transport of chemicals for dyeing, finishing and water treatment;
- transport of the raw non-woven fabric.



The treatments of the process waters and production waste are included in the system boundaries. Moreover, the R&D activities (electricity consumption, chemicals, etc.) are included in the system boundaries.

Due to the lack of reliable data, Use phase and End-of-life treatment are excluded from the system boundaries

2.3 CUT-OFF RULES

Data for elementary flows to and from the product system contributing to a **minimum of 99%** of the declared environmental impacts have been included.

2.4 DATA QUALITY

The data quality requirements considered in the study are those laid down in the referenced PCR document. In line with these rules, **specific data taken directly from the production sites for the year 2017** were used, as well as secondary data taken from the **ecoinvent v.3.4 database**.

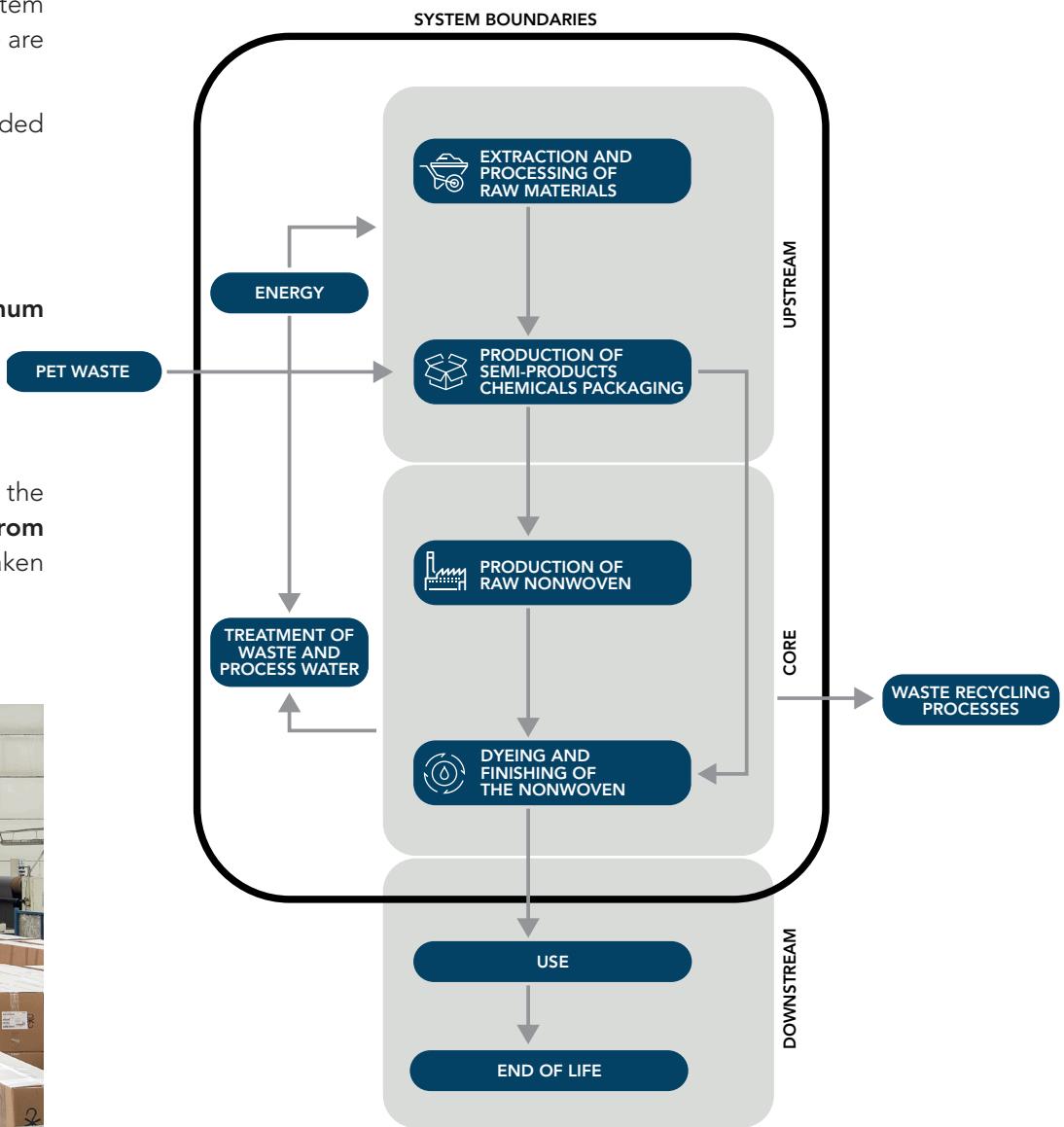
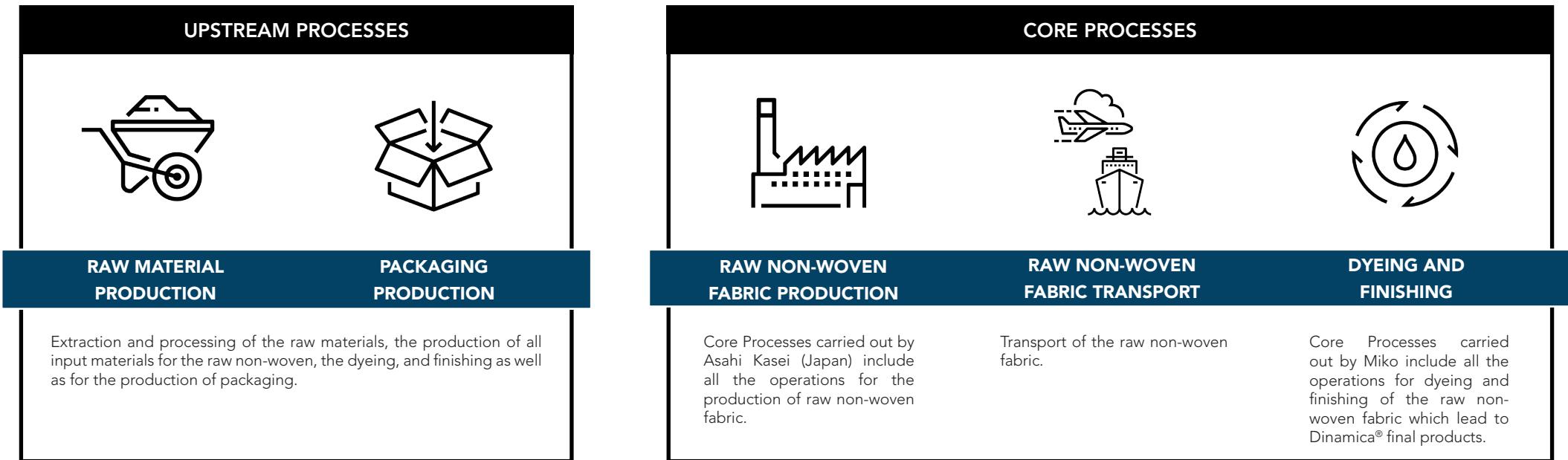


Fig. 2.1 – System boundaries



2.5 ENVIRONMENTAL PROFILE OF THE PRODUCT

Here below are the environmental profiles of **Dinamica® Auto**, **Dinamica® Auto Pure**, **Dinamica® Auto Stretch** and **Dinamica® Wide**.

The data concern the production of 1 m² of non-woven fabric, divided into Upstream Processes and Core Processes. In the tables totals may not match because of rounded data.

2.5.1 ENVIRONMENTAL PERFORMANCE DINAMICA® AUTO

Environmental Impacts

PARAMETER	UNIT	UPSTREAM		CORE			TOTAL	
		RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING		
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	1,45	0,10	2,28	0,07	1,83	5,73
	Biogenic	kg CO ₂ eq.	2,8E-03	2,9E-04	1,2E-03	2,6E-05	1,6E-01	1,7E-01
	Land use and land transformation	kg CO ₂ eq.	7,9E-04	8,4E-04	4,0E-04	3,5E-05	2,1E-04	2,3E-03
	TOTAL	kg CO ₂ eq.	1,45	0,10	2,28	0,07	1,99	5,90
Acidification potential (AP)		kg SO ₂ eq.	6,6E-03	4,9E-04	9,2E-03	1,4E-03	5,1E-03	2,3E-02
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	2,0E-03	2,9E-04	2,3E-03	1,5E-04	2,6E-03	7,3E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	4,1E-03	4,2E-04	5,3E-03	1,0E-03	3,2E-03	1,4E-02
Abiotic depletion potential – Elements		kg Sb eq.	6,8E-06	8,5E-07	2,5E-06	1,5E-08	1,6E-06	1,2E-05
Abiotic depletion potential – Fossil fuels		MJ, net calorific value	24,8	1,2	26,8	0,9	28,1	81,9
Water scarcity potential		m ³ eq.	1,06	3,5E-02	-3,5E-02	5,9E-03	3,8E-01	1,45

Recycled material content per declared unit

150g of recycled PET fibre is used to produce 1m² of Dinamica Auto®, corresponding to approximately 45% of the total product weight.

Use of resources

	PARAMETER	UNIT	UPSTREAM		CORE			TOTAL
			RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING	
Primary energy resources – Non Renewable	Use as energy carrier	MJ, net calorific value	26,2	1,5	31,4	1,0	32,8	92,9
	Used as raw materials	MJ, net calorific value	3,58	0	0	0	0	3,58
	TOTAL	MJ, net calorific value	29,8	1,5	31,4	1,0	32,8	96,5
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,38	1,00	2,33	0,02	3,14	7,87
	Used as raw materials	MJ, net calorific value	0	0	0	0	0	0
	TOTAL	MJ, net calorific value	1,38	1,00	2,33	0,02	3,14	7,87
Secondary material		kg	0,15	0	0	0	0	0,15
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Net use of fresh water		m³	0,01	1,08E-03	0,68	1,19E-04	0,09	0,79

Waste production and output flows

Hazardous waste disposed	kg	0	0	0
Non-hazardous waste disposed	kg	0	0,16	0,16
Radioactive waste* disposed	kg	4,8E-05	1,1E-04	1,6E-04
Components for reuse	kg	0	0	0
Material for recycling	kg	0	0,03	0,03
Materials for energy recovery	kg	0	0,05	0,05
Exported energy, electricity	MJ	0	1,14	1,14
Exported energy, thermal	MJ	0	0	0

(*) related to the energy mix dataset used for the LCA modelling

2.5.2 ENVIRONMENTAL PERFORMANCE DINAMICA® AUTO PURE

Environmental Impacts

PARAMETER	UNIT	UPSTREAM		CORE			TOTAL	
		RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING		
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	1,27	0,10	2,28	0,07	1,83	5,55
	Biogenic	kg CO ₂ eq.	2,6E-03	2,9E-04	1,2E-03	2,6E-05	1,6E-01	1,7E-01
	Land use and land transformation	kg CO ₂ eq.	6,5E-04	8,4E-04	3,9E-04	3,5E-05	2,1E-04	2,1E-03
	TOTAL	kg CO ₂ eq.	1,27	0,10	2,28	0,07	1,99	5,72
Acidification potential (AP)		kg SO ₂ eq.	6,0E-03	4,9E-04	9,2E-03	1,4E-03	5,1E-03	2,2E-02
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	1,7E-03	2,9E-04	2,3E-03	1,5E-04	2,6E-03	7,1E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	3,5E-03	4,2E-04	5,3E-03	1,0E-03	3,2E-03	1,3E-02
Abiotic depletion potential – Elements		kg Sb eq.	5,8E-06	8,5E-07	2,5E-06	1,5E-08	1,6E-06	1,1E-05
Abiotic depletion potential – Fossil fuels	MJ, net calorific value	20,0	1,2	26,8	0,9	28,2	77,1	

Recycled material content per declared unit

242g of recycled PET fibre is used to produce 1m² of Dinamica Auto® Pure, corresponding to approximately 73% of the total product weight.

The greater percentage of recycled PET used in Dinamica® Auto Pure leads to a reduction in CO₂ emissions of 3.1% compared to Dinamica® Auto. This equals 181g CO₂ eq. less for each square metre of non-woven fabric produced.

Use of resources

	PARAMETER	UNIT	UPSTREAM		CORE			TOTAL
			RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING	
Primary energy resources – Non Renewable	Use as energy carrier	MJ, net calorific value	23,0	1,5	31,4	1,0	32,8	89,6
	Used as raw materials	MJ, net calorific value	1,27	0	0	0	0	1,27
	TOTAL	MJ, net calorific value	24,2	1,5	31,4	1,0	32,8	90,9
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,25	1,00	2,33	0,02	3,14	7,73
	Used as raw materials	MJ, net calorific value	0	0	0	0	0	0
	TOTAL	MJ, net calorific value	1,25	1,00	2,33	0,02	3,14	7,73
Secondary material		kg	0,24	0	0	0	0	0,24
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Net use of fresh water		m³	0,01	1,08E-03	0,68	1,19E-04	0,09	0,79

Waste production and output flows

Hazardous waste disposed	Kg	0	0	0
Non-hazardous waste disposed	Kg	0	0,16	0,16
Radioactive waste* disposed	Kg	4,8E-05	1,1E-04	1,6E-04
Components for reuse	Kg	0	0	0
Material for recycling	Kg	0	0,03	0,03
Materials for energy recovery	Kg	0	0,05	0,05
Exported energy, electricity	MJ	0	1,14	1,14
Exported energy, thermal	MJ	0	0	0

(*) related to the energy mix dataset used for the LCA modelling

2.5.3 ENVIRONMENTAL PERFORMANCE DINAMICA® AUTO STRETCH

Environmental Impacts

PARAMETER	UNIT	UPSTREAM		CORE			TOTAL	
		RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING		
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	1,58	0,11	2,66	0,52	2,12	6,99
	Biogenic	kg CO ₂ eq.	3,5E-03	3,1E-04	1,4E-03	6,0E-05	1,9E-01	1,9E-01
	Land use and land transformation	kg CO ₂ eq.	1,1E-03	8,9E-04	4,6E-04	6,4E-05	2,5E-04	2,8E-03
	TOTAL	kg CO ₂ eq.	1,58	0,12	2,67	0,52	2,31	7,19
Acidification potential (AP)		kg SO ₂ eq.	7,2E-03	5,5E-04	1,1E-02	3,2E-03	5,8E-03	2,8E-02
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	2,2E-03	3,3E-04	2,7E-03	4,5E-04	3,1E-03	8,7E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	4,4E-03	4,7E-04	6,2E-03	3,1E-03	3,7E-03	1,8E-02
Abiotic depletion potential – Elements		kg Sb eq.	8,3E-06	9,8E-07	2,9E-06	5,9E-08	1,8E-06	1,4E-05
Abiotic depletion potential – Fossil fuels		MJ, net calorific value	27,0	1,3	31,3	7,4	32,6	99,6
Water scarcity potentiala		m ³ eq.	1,26	3,9E-02	-4,1E-02	3,7E-02	4,4E-01	1,73

Recycled material content per declared unit

124g of recycled PET fibre is used to produce 1m² of Dinamica® Auto Stretch, corresponding to approximately 38% of the total product weight.

Use of resources

	PARAMETER	UNIT	UPSTREAM		CORE			TOTAL
			RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING	
Primary energy resources – Non Renewable	Use as energy carrier	MJ, net calorific value	28,6	1,6	36,7	8,0	37,9	112,8
	Used as raw materials	MJ, net calorific value	3,93	0	0	0	0	3,93
	TOTAL	MJ, net calorific value	32,5	1,6	36,7	8,0	37,9	116,7
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,71	1,10	2,72	0,05	3,63	9,21
	Used as raw materials	MJ, net calorific value	0	0	0	0	0	0
	TOTAL	MJ, net calorific value	1,71	1,10	2,72	0,05	3,63	9,21
Secondary material		kg	0,12	0	0	0	0	0,12
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Net use of fresh water		m³	0,01	1,15E-03	0,80	6,63E-04	0,11	0,92

Waste production and output flows

Hazardous waste disposed	kg	0	0	0
Non-hazardous waste disposed	kg	0	0,18	0,18
Radioactive waste* disposed	kg	6,2E-05	1,7E-04	2,3E-04
Components for reuse	kg	0	0	0
Material for recycling	kg	0	0,04	0,04
Materials for energy recovery	kg	0	0,05	0,05
Exported energy, electricity	MJ	0	1,33	1,33
Exported energy, thermal	MJ	0	0	0

(*) related to the energy mix datasets used for the LCA modelling

2.5.4 ENVIRONMENTAL PERFORMANCE DINAMICA® AUTO WIDE

Environmental Impacts

PARAMETER	UNIT	UPSTREAM		CORE			TOTAL	
		RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING		
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	1,36	0,11	2,36	0,06	1,88	5,77
	Biogenic	kg CO ₂ eq.	3,0E-03	3,0E-04	1,2E-03	2,2E-05	1,7E-01	1,7E-01
	Land use and land transformation	kg CO ₂ eq.	7,7E-04	8,5E-04	4,1E-04	3,0E-05	2,2E-04	2,3E-03
	TOTAL	kg CO ₂ eq.	1,37	0,11	2,36	0,06	2,04	5,94
Acidification potential (AP)		kg SO ₂ eq.	6,2E-03	5,0E-04	9,5E-03	1,2E-03	5,2E-03	2,3E-02
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	1,9E-03	3,0E-04	2,4E-03	1,3E-04	2,7E-03	7,4E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	3,9E-03	4,3E-04	5,5E-03	8,5E-04	3,3E-03	1,4E-02
Abiotic depletion potential – Elements		kg Sb eq.	7,2E-06	8,7E-07	2,5E-06	1,3E-08	1,6E-06	1,2E-05
Abiotic depletion potential – Fossil fuels		MJ, net calorific value	23,6	1,2	27,8	0,8	28,9	82,3
Water scarcity potentiala		m ³ eq.	1,06	3,6E-02	-3,7E-02	5,0E-03	3,9E-01	1,46

Recycled material content per declared unit

110g of recycled PET fibre is used to produce 1m² of Dinamica® Wide corresponding to approximately 37% of the total product weight.

Use of resources

	PARAMETER	UNIT	UPSTREAM		CORE			TOTAL
			RAW MATERIALS PRODUCTION	PACKAGING PRODUCTION	RAW NON-WOVEN FABRIC	RAW NON-WOVEN FABRIC TRANSPORT	DYEING AND FINISHING	
Primary energy resources – Non Renewable	Use as energy carrier	MJ, net calorific value	25,3	1,5	32,5	0,9	33,7	93,9
	Used as raw materials	MJ, net calorific value	3,19	0	0	0	0	3,19
	TOTAL	MJ, net calorific value	28,5	1,5	32,5	0,9	33,7	97,0
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,33	1,01	2,41	0,02	3,22	7,99
	Used as raw materials	MJ, net calorific value	0	0	0	0	0	0
	TOTAL	MJ, net calorific value	1,33	1,01	2,41	0,02	3,22	7,99
Secondary material		kg	0,11	0	0	0	0	0,11
Renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Non-renewable secondary fuels		MJ, net calorific value	0	0	0	0	0	0
Net use of fresh water		m³	0,01	1,09E-03	0,71	1,00E-04	0,10	0,82

Waste production and output flows

Hazardous waste disposed	kg	0	0	0
Non-hazardous waste disposed	kg	0	0,16	0,16
Radioactive waste* disposed	kg	5,6E-05	1,1E-04	1,6E-04
Components for reuse	kg	0	0	0
Material for recycling	kg	0	0,03	0,03
Materials for energy recovery	kg	0	0,05	0,05
Exported energy, electricity	MJ	0	1,18	1,18
Exported energy, thermal	MJ	0	0	0

(*) related to the energy mix datasets used for the LCA modelling



2.6 TREND OF THE CARBON FOOTPRINT

The following chart shows the trend of the Carbon Footprint data for Dinamica® Auto since the year 2010 (EPD® revision nr. 0). The scheme emphasizes the impact of the upstream processes and core processes done by Asahi Kasei (Japan) and Miko (Italy). The results refer to 1m² of microfibre.

The trend of the Carbon Footprint shows that the management of the EPD® Process has enabled MIKO to achieve an effective improvement of its environmental performance.

The trend of the carbon footprint shows a slight increase in the indicator, not directly attributable to worsening in terms of the core module or connected to the industrial processes managed by Asahi Kasei and Miko but due to the update of the Japanese energy mix (which shows a lower percentage of nuclear energy) and to the use of characterization factors updated with the IPCC (GWP) method. Regarding the impact associated with the processes carried out by Miko, an improvement in the environmental performance is highlighted with a decrease of -4% compared to what was declared in the previous EPD review.

UPSTREAM PROCESSES

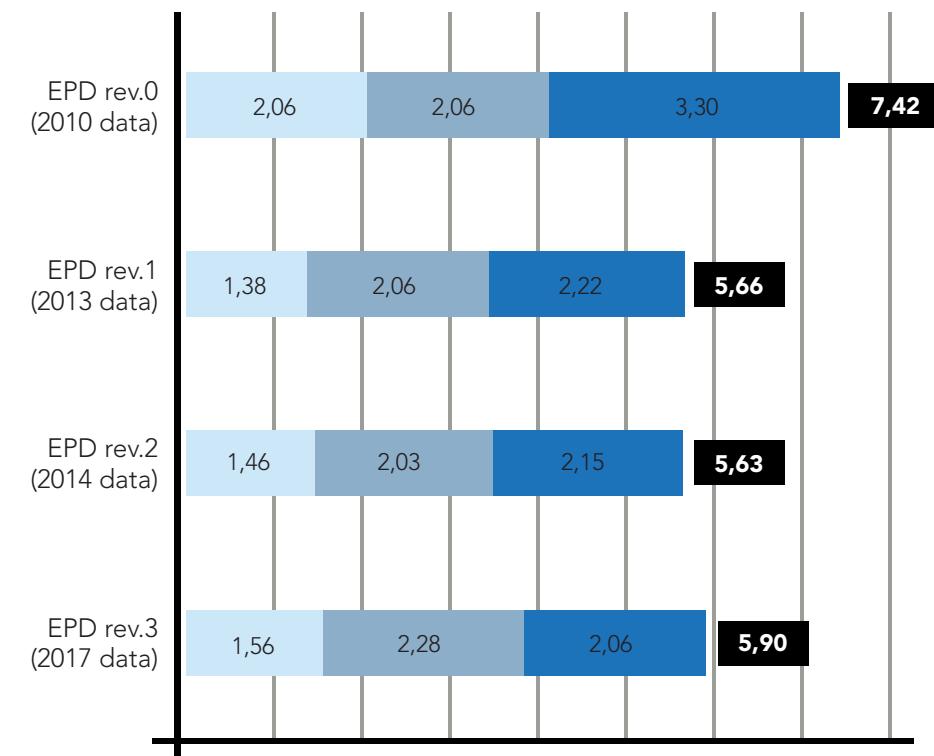
Upstream processes include the extraction and processing of the raw materials, the production of all input materials for the raw non-woven, the dyeing, and finishing as well as for the production of packaging.

CORE PROCESSES - ASAHI KASEI

Core Processes carried out by Asahi Kasei include all the operations for the production of raw non-woven fabric.

CORE PROCESSES - MIKO

Core Processes carried out by Miko include all the operations for dyeing and finishing of the raw non-woven fabric which lead to Dinamica® final products.



3. Additional information

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EPD® Process

Internal auditor:

Dr. Anna Bortoluzzi Quota Sette S.r.l.

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Product category rules (PCR):	PCR 2011:06 nonwovens for clothing, protective clothing and upholstery, v. 3.0 CPC 27922
The review of the PCR document was conducted by:	Technical Committee of the International EPD® System
Chair:	Filippo Sessa info@environdec.com
PCR Moderator:	Paolo Simon Ostan
Independent verification of the declaration and data, according to ISO 14025:	<input checked="" type="checkbox"/> EPD Process Certification <input type="checkbox"/> EPD Verification
Third party verifier:	SGS Italia S.p.A. via Caldera, 21 _ 20129 - Milano Tel. +39 02.73931 - Fax +39 02.70124630 - www.it.sgs.com
Accredited by:	ACCREDIA, certificate n. 006H

Programme operator: The International EPD® System EPD International AB Box 210 60
SE-100 31 Stockholm - Sweden — www.environdec.com

EPD within the same product category, but from different programs may not be comparable

Miko s.r.l. has the sole ownership, liability and responsibility of the EPD

DIFFERENCES from EPD® rev.3.0, December 2018

New company logos updates

Editorial changes paragraphs: 1.1, 1.3, 1.4, 1.5, 1.6

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